FCC Proceeding 02-146

Allocations and Service Rules for the 71-76, 81-86 and 92-95 GHz bands

Introduction

Harris Corporation ("Harris") commends the Commission's intent in ***NPRM 02-180*** in which new allocations and service rules in the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands are established. Harris hereby submits these comments in the hopes that they will help in the development of a favorable regulatory framework for potential users of these bands and as a basis for consideration in future rulemakings of similar bands.

Harris is a leading manufacturer of Telecommunications equipment including Microwave Communications Systems and has a long and distinguished history in the development of innovative technology for the Fixed Wireless industry. Our microwave communications products are in use by virtually all segments of the wireless industry.

Harris believes very strongly that the millimeter wave frequency bands represent an extraordinary opportunity for Telecommunications Service Providers, Equipment Manufacturers, and the public at large who will benefit from these new services. The millimeter wave bands are ideal for providing economical "Last Mile" solutions and for establishing High Density Fixed Service applications in urban areas. New microwave and wireless technologies operating in these frequency bands will help to satisfy the continued growing demand for transmission capacities beyond what can be provided economically by either conventional wireline or fiber optics techniques in many instances.

Harris' recommendations regarding the NPRM are summarized below:

- Harris supports the Commission's position on the proposed usage of the 71 – 76 GHz and 81 – 86 GHz band wherein these bands will remain un-segmented. It is recommended that the bands remain un-segmented in order to provide the greatest flexibility and foster the growth of new technologies and transport techniques.

- Harris recommends the use of Part 101 type licensing (link-by-link) utilizing the Commissions' Universal Licensing System in the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands.

  This form of licensing assures the long-term operation of the link in the presence of other users of the spectrum, which is a necessary requirement for commercial and carrier-class use.

Harris supports the comments filed by the Wireless Communications Association International, Inc. (WCA) with regard to auctions. Harris believes it is imperative that as many users as possible have access to these bands in order to create sufficient demand to support the development of low-cost products that leverage high volume manufacturing techniques. Auctions tend to limit the majority of holdings into a small subset of the interested users. Further, Harris believes that holding spectrum auctions is premature for these bands in that the range of applications and economics is highly speculative at this stage. The economic potentials of these bands are as yet poorly defined. Historically, auctions where the economic potential of the spectrum was poorly understood, we have seen failure in either the auction process, or in the utilization of the spectrum post-auction.

As such, it is recommended that Fixed service licensing and coordination be conducted on a per-path (site-specific) basis utilizing, if necessary, third party coordination companies to screen applications prior to submission to the ULS, thus easing the regulatory burden imposed on the Commission.

- Harris recommends the proposed band plan III as a first option for the 92-25 GHz band, with band plan I as a second choice. From the perspective of service flexibility, band plan III provides the greatest opportunity.

  Coordination with Federal Government users has proven problematic in the past. License grant turnaround time is Harris' primary concern in this regard. If coordination issues with band plan III would be expected to be more difficult than with band plan I, Harris would prefer to see the implementation of band plan I.

- Harris recognizes the importance of encouraging systems employing advanced technologies for the purpose of increasing the efficiency and reducing requirements for coordination. However, Harris believes that the best economics and widespread utilization will result from deployment of systems based on less sophisticated technologies. For these reasons, Harris recommends that the regulatory environment be structured to have sufficient flexibility to efficiently support both conventional and anticipated next-generation technologies.

- Harris supports the development of emerging technologies and their use of these Bands, and believes that spectrum allocations should permit the following typical applications:

- Coordinated links with very high bit rates – such as OC-48 (2.4 GB/s)
- Sufficient bandwidth to support Gigabit Ethernet links
- “Carrier Class” connections for Common Carriers
- Private Networks and High Speed LAN extensions
- Base Station backhaul for 3G wireless operators
- Internet Service Providers (ISPs)
- Support of HDFS systems to exploit high frequency reuse and smart antenna technologies.
- Flexible band plans that can be utilized by both Commercial and Federal Government users.
- Paired and Unpaired allocations to permit both FDD and TDD technologies.

Discussion

A. Allocation Proposals

Modified WRC-2000 Spectrum Allocations

We agree with the Commission's proposals to accept a modified version of the spectrum allocations adopted at the World Radiocommunication Conference of 2000 (WRC-2000) to consolidate FSS and BSS downlinks in the 71-75.5 GHz band. Similarly, we support the proposal to consolidate uplinks in the 81-86 GHz band. These actions will greatly simplify the process of coordination of all terrestrial services and will afford adequate protection to the Radio Astronomy Services (RAS).

Protection for the RAS

Harris supports the Commission's position requiring additional coordination to protect the Radio Astronomy Service (RAS) in the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands. It is our belief that the added administrative burden imposed by RAS protection is greatly outweighed by preserving these important scientific endeavors and the public is thus better served.

Band Plans

1. 71 - 76 GHz and 81 – 86 GHz

Harris supports the previously filed proposal by Loea as well as subsequent comments filed by the Fixed Wireless Communications Coalition (FWCC), Boeing, and Endwave to authorize the entire 71 – 76 GHz and 81 – 86 GHz bands for fixed use. As it is very likely that future systems will require access to this entire 10 GHz bandwidth to provide sufficient throughput, we believe these bands are best left without further segmentation at this time.

2. 92 – 95 GHz

With regard to band plan preferences, Harris's main concerns are

1) License grant turnaround time
2) Availability of large un-segmented allocations

Harris recognizes the technical advantages for less segmentation of the band – and for that reason prefers Band Plan III, as proposed by Boeing. The 2,000 MHz band segment would support very high bit rate TDD systems as well as provide for adequate separation for FDD operations. However, Harris' paramount concern is the issue of license grant turnaround time. In band plan III, Federal and Commercial users as co-primary requiring coordination with Federal

agencies. This has proven problematic in the past. As an example, in the 23 GHz band[1], the time-consuming approval process that currently exists in securing approval from NTIA for new links has inhibited utilization and forcing users to other more crowed bands. For this reason, Harris can only recommend Band Plan III under that condition that specific measures are put into place in order to ensure quick turnaround of coordination with Federal agencies.

As an example, the current process of Conditional Licensing has proven to be an efficient means of enabling coordination and construction of new links in a timely manner with minimum impediment to the Public. If such Conditional Licensing could be implemented in bands shared with the Federal Government, Harris believes that the turnaround issue might be adequately addressed.

As an alternative, Harris recommends the Commission's Plan I for this band. Both the Commercial and Federal Government interests are served by providing separate allocations for each. Commercial Frequency Division Duplex (FDD) systems can share the paired band segments at 92.3 – 93.2 GHz and 94.1 – 95.0 GHz. The 900 MHz segment separation will reduce the Transmit / Receive filtering requirements for FDD Transceiver designs, thus reducing manufacturing costs. Further, under this plan, Commercial Time Division Duplex (TDD) systems can be accommodated in either segment. Harris' recommendation of this plan is

[1] Currently, licensing in the 21.2 – 23.6 GHz band, under § 101.147, extensive delays can result during the communication process with NTIA before FS channel allocations are approved. In some cases this delay has forced users to select less favorable frequencies for the timely deployment of new applications. Harris Corp. internal studies have indicated that commercial use of this band has been inhibited by the lengthy licensing process currently in place.

based upon the understanding that, other than in specific restricted areas, coordination with federal agencies is not required in the bands designated "Licensed on a primary basis" for non-Federal Government and "Secondary assignments, except on specified military installations where assignments are on a primary basis" for Federal Government users.

Harris respects the need for Primary access to the 92.0 – 95.0 GHz band on behalf of Federal Government entities at designated military installations. Harris believes that due to the limited transmission range of these systems, the majority of private sector Millimeter Wave operations will be conducted in densely populated urban areas, and this requirement is not considered to be a significant impediment to widespread exploitation of these bands by the commercial sector.

B. Service Rules

Unlicensed Operation

Harris agrees with and supports the comments previously filed in this matter by the Wireless Communications Association (WCA) with regard to unlicensed use of the Millimeter Wave spectrum. Harris agrees that unlicensed operations will play an important role in future telecommunications market development . Harris believes that additional spectrum for unlicensed operation be allocated only as existing unlicensed spectrum becomes in danger of overcrowding. The

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contiguous band from 57 – 64 GHz was recently allocated for this purpose and as yet has not seen significant utilization, further, this band is naturally suited to unlicensed operation due to higher atmospheric absorption providing increased isolation between uncoordinated users. In conclusion, we believe that there is sufficient bandwidth contained in the currently allocated segment from 57 – 64 GHz for unlicensed applications and recommend that the bands under consideration here be licensed.

Geographic Area Licensing

Harris believes that geographical licensing is appropriate in two cases

1) The nature of the service being supported in the bands are omni-directional or sectored.
2) The geographic license is essentially a method of transferring authority to allocate and mange spectrum usage to a third party.

With respect to case 1:

Harris considers Geographic area licensing to be unsuitable to these frequency bands in that the high loss propagation characteristics in these bands compels the use of highly directional transmissions in order to create links of reasonable distance and capacity. Cellular-type multipoint deployments are not deemed practical.

With respect to case 2:

Harris believes that there is no advantage to the public in the transferring of management authority to a third party. The Commission's existing and highly functional Universal Licensing System (ULS) should be used to process commercial license applications in the 71-76, 81-86 and 92-95 GHz bands, thus assuring regulator compliance and similar degrees of interference protection as afforded to fixed users at lower frequencies.

The Commission refers to "administrative burdens" imposed by large numbers of license applications in these bands and the ensuing complexity of the coordination process. Harris appreciates the concerns of the Commission and suggests that there exist modern computer modeling tools that could significantly reduce the complexity of the coordination and licensing process. Such graphically based computer models could eventually result in near real time coordination and licensing. As an alternative, third party coordination companies might be contracted by the FCC to perform the coordination and ULS preparation tasks.

The Commission refers to the "substantial expenses" imposed by individual license fees and suggests that individual license fees will reduce expansion flexibility for large urban licensees. While this may be true in some cases, it is also true that site-by-site licensing will permit service providers to expand their millimeter wave coverage footprints gradually, as new links are required, without having to pay for spectrum they don't need in the short term. Recent history has

clearly demonstrated that not all Wireless enterprises have been able to manage the debt burdens incurred in the process securing exclusive spectrum rights via geographic area licenses.

Recommendations:

We agree with the comments of the FWCC, WCA, LOEA and others with regard to Geographic Area Licensing. Coordinated Site-by-Site licensing is recommended over Geographic licensing as it will foster competition among service providers and licensees while providing equal access to all users with a level playing field. It is our belief that Geographic licensing can lead to too much spectrum being controlled by a few entities, possibly leading to spectrum "warehousing", and restricting use to many users

Site-by-site licensing will, we believe, provide maximum application flexibility for users of the Millimeter Wave bands: 1) Users can tailor application bandwidth to need; 2) Systems can be deployed without geographic restrictions; 3) Links can be deployed as needed, thus distributing spectrum costs over the lifetime of an application.

Defined Frequencies for Federal Government activities.

We generally agree with Defined Frequencies for Federal Government activities in these bands, and submit that this concept would work equally well with Site-by-site licensing as with Geographic licensing.

Alternatively, “Quiet Zones” around areas of Federal Government activity would be supported. It is unlikely that these areas would coincide with densely populated metropolitan areas where these bands would be in highest demand by the Commercial users.

Coordination with Canada and Mexico

Harris believes that any U.S. operations in the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands must not cause harmful interference to systems operating in Canada or Mexico. While use of these bands in other countries in unknown at this time, Harris would support the future development of similar cross-border coordination practices as those currently in us in these regions at lower frequency bands.

License Term, Renewal and Construction Procedures

Harris agrees with the comments previously filed by WCA and supports the Commission’s proposal to adopt a ten year license period in the 71-76 GHz, 81-

86 GHz and 92-95 GHz Bands. Any licensees who can demonstrate a significant record of service during its license term, and who have demonstrated regulatory compliance, should receive timely and expeditious renewal so as to continue serving the public. Harris believes that the public is best served by basing Licensing principles on records of service rather than on construction milestones.

Harris believes that the anticipated shorter deployment cycle for Millimeter Wave systems support a shortened construction interval than the current 18-month period dictated by Part 101[3]. Harris does not disagree with shorter construction periods as requested in previously filed comments[4]. Harris believes that focus must be put on the time taken to coordinate new links prior to submission to the licensing process as this will, in many cases, be the determining factor in utilizing millimeter wave bands over licensing at lower frequencies. Harris supports a guaranteed maximum coordination time limit on new fixed services applications in the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands as discussed *supra*.

C. Technical Requirements

Regulation under Part 101 of Commission Rules

Harris agrees with the comments filed by the WCA and supports extension of the Part 101 regulatory environment for fixed service applications in the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands.

[3] C.F.R 47 §101.63 (a)
[4] Wireless Communications Association International, comments filed 15 November 2002.

Mobile uses of the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands

Harris believes that the process of establishing a regulatory framework for mobile operations in the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands are best left to future Rulemaking proceedings.

Channelization Plans

Harris supports the comments previously filed by the WCA with regard to minimal segmentation of the 71-76 GHz, 81-86 GHz bands and supports the Commissions Plan III and I for the 92 – 95 GHz band.

Interference Protection Criteria

Harris supports the comments previously filed by the WCA with regard to interference protection. However, we do believe that the criteria of §101.105 could be applied to any established *de facto* frequency plans that may ensue from commercial fixed use in the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands. For those instances where no such frequency plans are established, Harris supports the WCA's recommendation of the use of the band-edge filtering criteria illustrated in of §101.111(a)(2)(ii)[5]

[5] In any 1 MHz band, the center frequency of which is removed from the assigned center frequency by a percentage P of more than 50% up to and including 250% of the authorized bandwidth B, the minimum radiation suppression A, in dB, is less than:
$A = 11+0.4(P-50)+10\log_{10}B$ or A=56, whichever is smaller.

EIRP Limit and Antenna Directivity

Harris agrees with the previously filed comments of the WCA and would support an EIRP limit of +55dBW, as applied to other Part 101 fixed service bands above 20 GHz. Furthermore, Harris supports the WCA comments on antenna gain and directivity.

Antenna Polarization

Harris shares the same concerns regarding antenna polarization as expressed in the comments filed by the WCA. Linear polarization is to be preferred for fixed operations as it will afford maximum Cross Polarization Discrimination and thus facilitate the frequency coordination process.

RF Safety

Harris agrees with the Commission in requiring licensees and manufacturers of equipment in the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands be subject to the non ionizing radiation exposure limits requiring an environmental evaluation if the following condition is met:

$$\mathbf{4P/A > 1\ mW/cm^2}$$

where:

A = Area of the Antenna in cm^2
P = Transmitter power in mW

Harris recognizes the importance of exposure limits to Non-Ionizing radiation and to the protection of the public from this potential health hazard.

Conclusion

Harris believes that NPRM 02-180 provides a thorough and viable regulatory framework that will well serve the needs of the Public as well as Commercial and Federal Government interests to achieve optimum utilization of the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands. We urge the Commission to proceed with a timely adoption of the rules proposed in NPRM and to consider Harris Corporation's comments contained herein in their adjudication of these matters.

Respectfully submitted,

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